इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 1885-22 (1967): Electrotechnical vocabulary, Part 22: Equipment for radio communications, transmitting and receiving [LITD 7: Audio, Video and Multimedia Systems and Equipment]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN
IGNORANTIA JURIS NON EXCUSAT
PROTECTED BY COPYRIGHT

( Reaffirmed 2001 )

# *Indian Standard*

# ELECTROTECHNICAL VOCABULARY

## PART XXII EQUIPMENTS FOR RADIOCOMMUNICATIONS, TRANSMITTING AND RECEIVING

( Second Reprint FEBRUARY 1989 )

UDC 001.4:621.396.61/.62

© *Copyright* 1967

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 6

*December* 1967

# *Indian Standard*

# ELECTROTECHNICAL VOCABULARY

## PART XXII EQUIPMENTS FOR RADIOCOMMUNICATIONS, TRANSMITTING AND RECEIVING

Electrotechnical Standards Sectional Committee, ETDC 1

| *Chairman* | *Representing* |
|---|---|
| SHRI T. V. BALAKRISHNAN | Bharat Heavy Electricals Ltd, Hardwar |
| *Members* | |
| ADDITIONAL CHIEF ENGINEER | Directorate General of Posts & Telegraphs ( Department of Communications ) |
| DIRECTOR OF TELEGRAPHS (L) ( *Alternate* ) | |
| SHRI G. K. AHUJA | Inspection Wing, Directorate General of Supplies and Disposals ( Ministry of Supply, Technical Development & Materials Planning ) |
| SHRI A. S. NAGARKATTI ( *Alternate* ) | |
| SHRI V. W. CHEMBURKAR | Indian Electrical Manufacturers' Association, Calcutta |
| SHRI Y. P. KAUSHIK ( *Alternate* ) | |
| DIRECTOR | Electronics and Radar Development Establishment ( Ministry of Defence ), Bangalore |
| SHRI G. D. JOGLEKAR | Primary Cells and Batteries Sectional Committee, ETDC 10, ISI; *and* Secondary Cells and Batteries Sectional Committee, ETDC 11, ISI |
| SHRI S. N. MUKERJI | National Test House, Calcutta |
| PROF R. C. NARAYANAN | General Nomenclature & Symbols Subcommittee, ETDC 1 : 3, ISI |
| SHRI A. R. NARAYANA RAO | Institution of Engineers ( India ), Calcutta |
| SHRI H. V. NARAYANA RAO | Central Water & Power Commission ( Power Wing ) |
| SHRI S. N. VINZE ( *Alternate* ) | |
| SHRI U. K. PATWARDHAN | Transformers Sectional Committee, ETDC 16, ISI |
| SHRI R. RADHAKRISHNAN | Central Electro-Chemical Research Institute ( CSIR ), Karaikudi |
| SHRI H. N. VENKOBARAO ( *Alternate* ) | |
| SHRI K. RAMANATHAN | Heavy Electricals ( India ) Ltd, Bhopal |
| SHRI S. K. BHATIA ( *Alternate* ) | |
| SHRI V. V. RAO | Department of Communications ( Wireless Planning and Co-ordination Wing ) |
| SHRI A. P. SEETHAPATHY | Switchgear and Controlgear Sectional Committee, ETDC 17, ISI; *and* Power Frequency and Voltages Subcommittee, ETDC 1 : 1, ISI |
| SHRI R. K. TANDAN | National Physical Laboratory ( CSIR ), New Delhi |
| SHRI S. THIRUVENKATACHARI | Electronic Equipment Sectional Committee, ETDC 24, ISI |

( *Continued on page* 2 )

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

( *Continued from page* 1 )

| *Members* | *Representing* |
|---|---|
| SHRI V. VENUGOPALAN | Insulators and Accessories Sectional Committee, ETDC 3, ISI |
| SHRI J. S. ZAVERI | Rotating Machinery Sectional Committee, ETDC 15, ISI |
| SHRI Y. S. VENKATESWARAN, Director ( Elec tech ) ( *Secretary* ) | Director General, ISI ( *Ex-officio Member* ) |

## Electronic Equipment Sectional Committee, ETDC 24

| *Chairman* | |
|---|---|
| SHRI S. THIRUVENKATACHARI | Directorate General of All India Radio ( Ministry of Information & Broadcasting ) |

| *Members* | |
|---|---|
| RESEARCH ENGINEER, AIR ( *Alternate* to Shri S. Thiruvenkatachari ) | |
| SHRI M. K. BASU | Radio Receivers Subcommittee, ETDC 24 : 1, ISI |
| CHIEF ENGINEER | Overseas Communications Service ( Department of Communications ) |
| DIRECTOR ( *Alternate* ) | |
| SHRI P. N. DEOBHAKTA | Directorate General of Technical Development ( Ministry of Supply, Technical Development & Materials Planning ) |
| SHRI A. N. MUKHERJEE ( *Alternate* ) | |
| DEPUTY DIRECTOR OF STORES ( TECH ) | Naval Headquarters |
| STAFF OFFICER, ELECTRICAL ENGINEERING ( STANDARDIZATION ) ( *Alternate* ) | |
| SHRI V. M. GOGTE | Wireless Planning & Co-ordination Wing ( Department of Communications ) |
| SHRI K. N. GOPALAKRISHNAN | Directorate General of Civil Aviation ( Department of Civil Aviation ) |
| SHRI B. R. V. VARDAN ( *Alternate* ) | |
| SHRI H. JOGA RAO | State Broadcasting Department, Government of Andhra Pradesh |
| SHRI S. T. KAGALI | Bharat Electronics Ltd, Bangalore |
| SHRI K. S. KELKAR ( *Alternate* ) | |
| SHRI R. S. MUNDKUR ( *Alternate* ) | |
| SHRI M. N. KEKRE | Police Wireless ( Ministry of Home Affairs ) |
| SHRI H. J. MIRCHANDANI | Indian Telephone Industries Ltd, Bangalore |
| SHRI S. D. MANI ( *Alternate* ) | |
| SHRI J. S. MONG | All India Radio Merchants' Association, Bombay |
| SHRI V. J. BHATT ( *Alternate* ) ( Bombay ) | |
| SHRI D. N. CHAUDHURI ( *Alternate* ) ( Calcutta ) | |
| SHRI L. S. V. EASWAR ( *Alternate* ) ( Madras ) | |
| SHRI S. N. MUKERJI | National Test House, Calcutta |
| SHRI B. P. GHOSH ( *Alternate* ) | |

( *Continued on page* 21 )

# *Indian Standard*
# ELECTROTECHNICAL VOCABULARY
## PART XXII EQUIPMENTS FOR RADIOCOMMUNICATIONS, TRANSMITTING AND RECEIVING

## 0. FOREWORD

**0.1** This Indian Standard ( Part XXII ) was adopted by the Indian Standards Institution on 26 October 1967, after the draft finalized by the Electrotechnical Standards Sectional Committee in consultation with the Electronic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** A series of standards has been prepared with a view to bringing together the terms relating to radiocommunications covering different aspects, such as circuits, radio wave propagation, aerials, transmitting and receiving equipment, radio-telegraphy and mobile radio, sound and television broadcasting, radiolocation and radio-navigation, etc. This standard deals with terms relating to equipment for radiocommunications, transmitting and receiving.

**0.3** The definitions contained in this standard have been drawn up with the object of striking a correct balance between absolute precision and simplicity. The principal object of the standard is to provide definitions which are sufficiently clear so that each term is understood with the same meaning by all electrical engineers and it does not, therefore, constitute a treatise on electrical engineering. Thus, it may sometimes be felt that the definitions are not sufficiently precise, do not include all cases, do not take account of certain exceptions or are not identical with those which may be found in other publications designed with other objects and for other readers. Such imperfections, which will be eliminated as far as possible in later editions, are inevitable and should be accepted in the interest of simplicity and clarity.

**0.4** This standard is one of the series of Indian Standards on electrotechnical vocabulary.

**0.5** This standard largely follows IEC Draft Publication 50(60), Group 60 ' Radiocommunications ' brought out by International Electrotechnical Commission. Assistance has also been derived from B.S. 204 : 1960 ' Glossary of terms used in telecommunication ( including radio ) and electronics ' issued by the British Standards Institution.

## 1. SCOPE

**1.1** This standard ( Part XXII ) covers definitions of terms used in the field of transmitting and receiving equipment.

## 2. GENERAL

**2.1 Designation of Emissions** — These are classified and symbolized according to the following characteristics:

a) Type of modulation of main carrier,
b) Type of transmission, and
c) Supplementary characteristics.

| CHARACTERISTIC | SYMBOL |
|---|---|
| 1) *According to Type of Modulation of Main Carrier* | |
| a) Amplitude | *A* |
| b) Frequency ( or phase ) | *F* |
| c) Pulse | *P* |
| 2) *According to Type of Transmission* | |
| a) Absence of any modulation intended to carry information | 0 |
| b) Telegraphy without the use of modulating audio-frequency | 1 |
| c) Telegraphy by the on-off keying of a modulating audio-frequency or frequencies or by the on-off keying of the modulated emission ( special case: an unkeyed modulated emission ) | 2 |
| d) Telephony ( including sound broadcasting ) | 3 |
| e) Facsimile ( with modulation of main carrier either directly or by a frequency modulated sub-carrier ) | 4 |
| f) Television ( vision only ) | 5 |
| g) Four-frequency diplex telegraphy | 6 |
| h) Multi-channel voice-frequency telegraphy | 7 |
| j) Cases not covered by the above | 9 |
| 3) *According to Supplementary Characteristics* | |
| a) Double sideband | None |
| b) Single sideband: | |
| Reduced carrier | *A* |
| Full carrier | *H* |
| Suppressed carrier | *J* |

| CHARACTERISTIC | SYMBOL |
|---|---|
| c) Two independent sidebands | *B* |
| d) Vestigial sideband | *C* |
| e) Pulse: | |
| Amplitude-modulated | *D* |
| Width ( or duration ) modulated | *E* |
| Phase ( or position ) modulated | *F* |
| Code modulated | *G* |

*Examples*:

1) Amplitude-modulated telephony, single sideband reduced carrier — *A3A*
2) Pulse-modulated telegraphy, audio-frequencies modulating the phase ( or position ) of the pulse — *P2F*

NOTE 1 — As an exception to the above, damped waves are designated by *B*.

NOTE 2 — Extensive further examples are given in the Radio Regulations ITU Geneva 1959 from which the information in **2.1** is extracted.

**2.2 Radio Station** — One or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment necessary at one location for carrying a radiocommunication service.

## 3. RADIO TRANSMITTERS

**3.1 Radio Transmitters** — Apparatus for the production and modulation of radio frequency energy for the purpose of radiocommunication.

**3.2 Suppressed Carrier Transmitter** — A radio transmitter which emits sidebands only.

**3.3 Mobile Transmitter** — A radio transmitter designed for operation in a stationary or moving vehicle, vessel or aircraft.

**3.4 Fixed Frequency Transmitter** — A radio transmitter designed to operate on a single fixed carrier frequency.

**3.5 Multi-Frequency Transmitter** — A radio transmitter capable of operating on any one of a number of pre-set carrier frequencies.

**3.6 Multiplex Transmitter** — A radio transmitter designed to provide several channels of communication simultaneously, using a single carrier frequency.

NOTE — Examples are: frequency-division multiplex, time-division multiplex, a combination of the above.

**3.7 Frequency-Division Multiplex Transmitter** — A multiplex transmitter in which the transmitted band of frequency is divided into bands each allocated to one channel.

**3.8 Time-Division Multiplex Transmitter** — A multiplex transmitter in which the instantaneous amplitudes of signals corresponding to the channels are transmitted successively and periodically.

**3.9 Multiple Transmitter** — A radio transmitter designed to provide several channels of communication simultaneously but on different radio frequencies.

**3.10 Multi-Channel Transmitter** — A radio transmitter designed to provide several channels of communication simultaneously.

NOTE — Examples are: multiplex, multi-carrier and multi-carrier multiplex radio transmitters.

**3.11 Multi-Carrier Radio Transmitter** — A radio transmitter designed to provide several channels of communication simultaneously on adjacent carrier frequencies.

**3.12 Channelized Transmitter** — A radio transmitter designed to provide several channels of communication operating simultaneously but on different radio frequencies. Each channel has its own modulation circuits but all channels operate from a common power supply.

**3.13 Spark Transmitter** — A transmitter in which the waves sent out are caused by the recurring discharges of a capacitor across a spark-gap.

**3.14 Arc Transmitter** — A radio sender in which radio frequency oscillations are generated by means of an electric arc.

**3.15 Self-Excited Transmitter** — A radio transmitter in which the oscillator determining the carrier frequency, also generates the radiated radio frequency energy.

**3.16 Driven Transmitter** — A radio transmitter the carrier frequency of which is derived from a separate master oscillator or combination of master oscillators.

**3.17 Chireix Transmitter** — A double sideband amplitude-modulation radio transmitter, using two radio-frequency amplifying paths, in one of which the sidebands are shifted in phase by +90° and in the other by —90° relative to their phases in normal amplitude modulation. In consequence, in each path, the modulated wave is practically constant in amplitude and can be amplified by high-efficiency Class C stages, with small distortion. The normal amplitude-modulated output is obtained by a suitable combination of the outputs from the two paths into the common load.

**3.18 Fagot Modulation Transmitter** — A transmitter employing a combination of Chireix modulation and direct amplitude modulation, used for amplitudes of the modulated wave respectively greater and smaller than the carrier amplitude. With this technique high transmitter efficiency is obtainable.

**3.19 Doherty Transmitter** — A type of amplitude-modulation radio transmitter designed to obtain high efficiency of operation regardless of the varying amplitude of the modulation. Its distinguishing feature is the use of two valves, one of which is connected directly to the load and the other is connected to the load through a quarter-wave network.

**3.20 Television Sound-Transmitter** — A radio transmitter which provides the sound modulated wave of a television service.

**3.21 Television Vision-Transmitter** — A radio transmitter which provides the vision-modulated wave of a television service.

**3.22 Television Transmitter** — The combination of a television-vision and a television-sound transmitter.

**3.23 Transmitter-Receiver** — A single unit embodying separate transmitting and receiving sets, usually with a common aerial.

**3.24 Transceiver** — A combined radio transmitter and receiver in which some valves and circuits other than those of the power supply are common to both transmitter and receiver, and not providing or simultaneous transmission and reception.

NOTE — The name is also given to a combined equipment for facsimile transmission and reception.

**3.25 Class A Modulation** — The operation of an amplitude modulation system in which the final stage of modulation-frequency amplification employs Class ' A ' valve operation.

**3.26 Class B Modulation** — The operation of an amplitude modulation system in which the final stage of modulation-frequency amplification employs Class ' B ' valve operation.

**3.27 High-Power Modulation/High Level Modulation** — Modulation of the carrier of a radio transmitter effected in the final radio-frequency amplifier, usually in its anode circuit.

**3.28 Low-Power Modulation** — Modulation of the carrier of a radio transmitter effected in a stage prior to the final radio-frequency amplifier.

**3.29 Choke Modulation/Constant-Current Modulation/Heising Modulation** — A method of amplitude modulation in which the anode supply to a radio frequency stage and its associated modulating stage is obtained from a common inductor of very high impedance at modulation frequency and feeding from a direct current source.

**3.30 Series Modulation** — A method of amplitude modulation in which the modulating valve and modulated amplifier valve are in series across the anode voltage supply.

**3.31 Floating-Carrier Modulation/Controlled-Carrier Modulation**— A system of amplitude modulation used in radio transmitters in which the carrier level is varied in proportion to the short term mean amplitude of the modulating signal so that the modulation factor is approximately constant.

**3.32 Quiescent-Carrier Modulation** — A system of modulation in which the carrier is radiated only when modulation is occurring.

**3.33 Grid ( Anode ) ( Suppressor Grid ) Amplitude Modulation** — Amplitude modulation effect by applying the modulating signal to the grid ( anode ) ( suppressor grid ) of a valve.

**3.34 Amplitude Modulation by Load Fluctuation** — Amplitude modulation of the output of a radio transmitter produced by means of a variable-impedance device inserted in, or coupled to, the output circuit.

**3.35 Absorption Modulation** — Amplitude modulation obtained by energy absorption controlled by the modulating signal.

**3.36 Over-Modulation** — Of an amplitude modulated transmitter.

a) A condition of modulation in which the mean level of the modulating signal is such that the peak value of the signal exceeds the value necessary to produce 100 percent modulation.
b) Distortion resulting from this condition.

**3.37 Armstrong Modulation** — Frequency modulation obtained by the addition in phase quadrature of two oscillations having the same frequency and one of which is amplitude modulated.

**3.38 Phase ( Frequency ) Modulation by Inductance Variation** — Phase ( frequency ) modulation obtained by varying the increment permeability of an indicator by means of an auxiliary winding carrying the modulating signal.

**3.39 Wobble Modulation** — Frequency modulation at a frequency low relative to that of the modulation frequency of an amplitude modulated carrier.

NOTE — It has been used, for example, for increasing the degree of secrecy obtainable with a radio telephony system, or for anti-fading with radio telegraphy transmission, or for jamming.

**3.40 Amplitude Keying** — A form of keying in which the variable characteristic is the amplitude of the oscillation.

**3.41 On-Off Keying** — Keying in which the amplitude changes between zero and a discrete value.

**3.42 Master Oscillator** — An oscillator used to generate a constant frequency from which is derived the carrier frequency or frequencies of a radio transmitter.

**3.43 Resonant-Circuit Drive** — A master oscillator, whose frequency is determined by the electrical characteristics of a resonant-circuit.

**3.44 Line Stabilized Oscillator Drive** — A master oscillator, the frequency of which is determined by the resonance properties of a length of transmission line.

**3.45 Electromechanical Drive** — A master oscillator, the frequency of which is determined by the vibration of an electromechanical element.

**3.46 Crystal Oscillator Drive/Crystal Drive** — An electromechanical drive, the frequency of which is determined by the vibration of a crystal having piezo-electric properties.

**3.47 Tuning-Fork Oscillator Drive** — An electromechanical drive, the frequency of which is determined by the vibration of a tuning-fork.

**3.48 Tank Circuit** — The tuned circuit in the anode circuit of the final stage of a transmitter which supplies the radio frequency energy to the aerial or aerial feeder.

**3.49 Absorber Circuit** — A circuit incorporated in a radio-telegraphy transmitter ( A1 ) in which high tension power is absorbed during ' space ' so as to eliminate ( full power absorber ) or reduce ( partial absorber ) the fluctuation of the load on the primary power supply when the transmitter is keyed.

**3.50 Absorber Circuit Factor** — The ratio of the power taken from a radio transmitter main high tension supply during ' space ' to that taken during ' mark '.

**3.51 Frequency Monitor** — A device for indicating ( for example, by deflection of a calibrated meter ) the departure of an oscillator frequency from its assigned value.

**3.52 Spark Gap** — A piece of apparatus designed for repeated disruptive discharges between its electrodes.

**3.53 dc Anode Power Input** — To a stage of a radio transmitter. The dc power delivered to the anode of a valve from the source of high tension supply; it is the product of the dc anode voltage and the dc anode current.

**3.54 Total Anode Power Input** — The sum of the dc anode power input and the ac power delivered to the anode of a valve from the source of modulation.

**3.55 Anode Efficiency of a Radio Frequency Stage** — The ratio of the radio frequency output power of the stage to the dc power input to the anode circuit.

**3.56 Power Consumption** — Of a radio transmitter. The power delivered to the apparatus under specified conditions of operation, and including the power absorbed by all essential auxiliaries required for continuous operation.

**3.57 Overall Efficiency** — The ratio of the useful power output to the corresponding power consumption.

**3.58 Load or Output Load** — Of a radio transmitter. The output termination. This may be an aerial, a feeder system, or, for test purpose, an artificial load.

**3.59 Optimum Load Impedance** — Of a radio transmitter. The impedance presented by the load at which optimum performance is obtained under specified operating conditions.

**3.60 Peak Envelope Power** — Of a radio transmitter. The average power supplied to the aerial transmission line or specified artificial load by a transmitter during one radio frequency cycle at the highest crest of the modulation envelope, taken under conditions of normal operation.

**3.61 Mean Power** — Of a radio transmitter. The power supplied to the aerial transmission line or specified artificial load by a transmitter during normal operation, averaged over a time sufficiently long compared with the period of the lowest frequency encountered in the modulation. A time of 1/10 second during which the mean power is greatest will be selected normally.

**3.62 Carrier Power** — Of a radio transmitter. The average power supplied to the aerial transmission line or specified artificial load by a transmitter during one radio frequency cycle under conditions of no modulation. For each class of emission, the condition of no modulation shall be specified.

**3.63 Rated Output Power** — Of a radio transmitter. The RF power nominally available at the output terminal device of the transmitter under specified conditions of operation.

NOTE — Rated output power is expressed in terms of mean output power ( MOP ), or carrier output power ( COP ) depending on the type of emission.

**3.64 Mean Output Power ( MOP )** — Of a radio transmitter. The power supplied to the output terminal device by a transmitter under specified conditions of operation, averaged over a time sufficiently long compared with the period of the lowest frequency encountered in the modulation. A time of 1/10 second during which the mean output power is greatest will be selected normally.

**3.65 Carrier Output Power ( COP )** — Of a radio transmitter. The average power supplied to the output terminal device by a transmitter during one radio frequency cycle, taken under specified conditions of operation and no modulation.

**3.66 Output Power *vs* Frequency Characteristic Within the RF Range** — Of the whole or part of a radio transmitter. The variation of the output power with respect to frequency, the transmitter being re-tuned for operation at each frequency.

**3.67 Bandwidth Characteristic ( Output Power *vs* Frequency Characteristic Within the Passband )** — Of the whole or part of a radio transmitter. The variation of the output power with respect to frequency, the transmitter having been adjusted for operation on a specified frequency, the frequency variation normally being only a small percentage of the specified frequency.

**3.68 Useful Output Power** — The mean power at those frequencies which are necessary to transmit the desired intelligence dissipated in an output load of specified characteristics under prescribed operating conditions.

**3.69 Unwanted Output Power** — The mean power at the output terminal device of a radio transmitter under specified conditions of modulation for a given class of emission at a frequency or at a narrow band of frequencies outside the necessary band, the level of which may be reduced without affecting the corresponding transmission of information.

**3.70 Duty Cycle** — Of a radio transmitter. The time during which the transmitter may be safely operated under specified conditions, in proportion to the sum of this time and the time necessary for colling down, so that this cycle may be repeated indefinitely.

**3.71 Scintillation** — Of a radio transmitter. Unwanted momentary rapid fluctuations of the operating frequency.

NOTE — In particular, scintillation is considered to be the effect of the following causes:

a) The amplitude modulation;
b) Mechanical vibrations of parts, or ancillary equipment belonging to the transmitter;
c) Imperfect filtering of dc voltage; and
d) Irregularities in the electronic tubes and valves in frequency determining stages.

## 4. RADIO RECEIVERS

**4.1 Radio Receiver** — A device connected to an aerial or other source of radio signals in order to make available in some desired form the required information content of the signals.

**4.2 Tuned RF Reception/Straight Reception** — A method of reception in which amplification before detection is made solely on the radio frequency signal as received by the aerial.

**4.3 Beat Reception/Heterodyne Reception** — Reception in which the signal frequency is changed to audio-frequency by means of beats produced by the combination of locally generated radio frequency oscillations and the signal oscillations followed by detection.

**4.4 Beat Oscillator** — An oscillator which generates the local oscillations for beat reception.

**4.5 Superheterodyne Reception** — A method of reception in which the signal carrier frequency is changed to another, generally a lower radio frequency, by a heterodyne process. There may be more than one such change of radio frequency.

NOTE — The method was originally called ' supersonic heterodyne reception '.

**4.6 Local Oscillator/Frequency Change Oscillator** — An oscillator used to produce a change of frequency in superheterodyne reception.

**4.7 Beat Frequency Oscillator** — In superheterodyne reception. The adjustable oscillator operating near the final intermediate frequency which serves to make an $A_1$ signal audible.

**4.8 Autodyne Reception** — A form of beat reception in which the circuit which generates the beating oscillation also performs other functions, such as amplification or detection.

**4.9 Homodyne Reception** — A method of reception of modulated waves, in which a local oscillator is synchronized in correct phase relation with the signal carrier frequency.

**4.10 Intermediate Frequency ( IF )** — In superheterodyne reception the frequency to which the signal carrier frequency is changed. If there be more than one such change of frequency the successive intermediate frequencies are known as the first, second, etc, intermediate frequency.

**4.11 Image Frequency/Second Channel Frequency**

a) In superheterodyne reception. A frequency, other than that to which the receiver is tuned, which is such that the difference between this frequency and that of a local oscillator in the receiver is a frequency lying within the passband of an intermediate frequency amplifier in the receiver, in which it produces an unwanted response.

b) In heterodyne reception. A frequency such that the beat with the beat frequency oscillator is of the same frequency as that produced by the wanted signal.

**4.12 Regenerative Reception** — Reception in which the effect of positive feedback is used to increase the sensitivity and selectivity of an oscillating circuit by reducing the damping.

**4.13 Super-Regenerative Reception** — A method of reception employing amplification in which positive feedback is adjusted to a point at which oscillation occurs or is liable to occur; any oscillation being periodically suppressed at an ultrasonic frequency or at the frequency which is high compared with the modulation frequency.

**4.14 Quench Frequency** — In super-regenerative reception. The frequency of the periodic suppression of oscillation.

**4.15 Diversity Reception** — A method of reception in which a single output signal is derived from a combination of, or selection from, a plurality of transmission channels or paths.

NOTE — The method of reception employed may include space diversity, ray diversity, polarization diversity, or channel diversity.

**4.16 Exalted Carrier Reception** — Of amplitude modulated systems. A method of reception in which the amplitude of the carrier in an asymmetrical, vestigial or double-sideband transmission system is increased relative to that of the sidebands. The purpose is reduction of distortion occurring in any envelope following detector arising either from overmodulation due to selective fading or from asymmetry of sidebands.

**4.17 Local Carrier Reception/Local Carrier Demodulation** — A method of reception, usually in single-sideband systems, in which the carrier for demodulation is supplied by an oscillator, at the receiver at such a level that the carrier of the incoming signal, which may already be partially suppressed has negligible effect.

**4.18 Reconditioned Carrier Reception/Reconditioned Carrier Demodulation** — A method of reception, usually in reduced carrier single-sideband systems, in which the carrier for demodulation is obtained by filtering, amplifying and limiting the carrier obtained from the incoming signal, thus removing unwanted amplitude variations, modulations and noise, that is, reconditioning it.

**4.19 Sensitivity**

a) The characteristic of a receiver which determines the minimum usable input; and

b) The least input which produces an output which satisfies certain specified requirements, including generally a specified output together with a specified signal-to-noise ratio.

**4.20 Selectivity** — The ability of a receiver to discriminate by frequency dependent selection, between a desired signal and co-existent undesired signals at other frequencies.

**4.21 Gain** — Of an amplifier or receiver. The ratio of two similar quantities real or complex, measured respectively at the output and input of the network.

*Examples*:

Power gain, voltage gain and current gain.

NOTE — The input and output impedances must be specified, if voltage or current gain is expressed in decibels.

**4.22 Receiver Radiation** — Electromagnetic radiation from a receiver and/or any conductors coupled thereto arising from a source or sources of electric oscillation in the receiver.

NOTE — This term is often used in connection with electric and magnetic fields from the receiver.

**4.23 Set Noise/Receiver Noise/Amplifier Noise** — Noise in the output of a receiver or amplifier, originating in the receiver or amplifier itself.

**4.24 Thermal Agitation Noise/Thermal Noise** — That part of set noise with a continuous spectrum, due solely to the thermal agitation of electrons in the conductors.

**4.25 Total Continuous Spectrum Noise/Hiss** — In a receiver. That part of set noise with a continuous spectrum, due to thermal agitation, shot noise, flicker effect, etc.

**4.26 Noise Figure/Noise Factor** — Ratio of the noise power of a radio receiver, assumed linear, and the noise power that would occur at the output of the receiver if there were not in the receiver any sources of noise other than those which exist in the external impedance connected at the input, assumed at a specified temperature, for example, 300°K.

**4.27 Muting/Squelch**

a) The process of inhibiting, by an automatic device incorporated in a receiver, any response ( usually acoustic ) to an excitation of less than some predetermined magnitude or any response with a signal-to-noise ratio below some predetermined value.

NOTE — The term ' noise suppression ' for this process is deprecated.

b) Automatically making a receiver insensitive when a neighbouring transmitter is working.

NOTE — This process is often termed ' desensitising '.

**4.28 Noise Suppression** — The limitation, by means of an incorporated device, of the response of a receiver to impulsive radio noise.

**4.29 Automatic Noise Limiter** — A device incorporated in a receiver to limit the effect of impulsive noise.

**4.30 Key-Click** — An unwanted disturbance in a receiving system caused by out-of-band radiation of a radio-telegraph transmitter.

**4.31 Automatic Gain Control ( AGC )** — Circuits incorporated in receiver, actuated by the received signal which cause the gain of the receiver to vary substantially inversely as the magnitude of the radio frequency input so as to maintain the output level substantially constant for a given modulation factor.

**4.32 Biased Automatic Gain Control** — Automatic gain control in which the control process comes into operation only for signals above a predetermined magnitude.

**4.33 Quiet Automatic Gain Control** — The combination of biased automatic gain control and muting, usually so designed as to inhibit any output from input signals which are too weak to actuate the gain control device.

**4.34 Automatic Frequency Control ( AFC )** — A feature incorporated in a receiver to compensate for small variations in the frequencies of the incoming signal or local oscillator or both.

**4.35 Automatic Tuning Control** — A system in which the receiver automatically adjusts its ganged circuits to substantially correct tuning when set approximately to the correct tuning point.

**4.36 Wave Trap** — A network used to reject certain signals and so to reduce interference with wanted signals in a receiving system.

**4.37 Interstation Noise Suppression/Interstation Muting** — An automatic feature of certain receivers whereby the output of the receiver is very much reduced, or cut off, while the receiver is being tuned from one wanted station to another, thus suppressing the output between the stations which would otherwise be accentuated by the normal action of the automatic gain control.

**4.38 Bandspreading** — A facility in receiving circuits whereby expanded-scale tuning can be effected over a selected narrow band of frequencies, the main tuning being either continuous or switched within the range of the tuned circuit.

**4.39 Detection** — The process of extracting information from an electromagnetic wave.

Note 1 — Often an asymmetrical conducting device is used.

Note 2 — The use of the term for the action of a frequency changer is deprecated.

Note 3 — Where there was no original modulating signal the use of the term ‘ demodulation ’ as an alternative or ‘ detection ’ is deprecated.

**4.40 Demodulation** — The process of reproduction of an original modulating signal from a modulated wave, that is, the inverse of modulation.

**4.41 Detector** — That part of a receiver in which the information content is extracted from the modulated signal.

**4.42 Demodulator** — A device used for demodulation.

**4.43 Linear Detector** — A detector whose output voltage is proportional to the amplitude of an unmodulated carrier applied to its input.

**4.44 Square Law Detector** — A detector whose output voltage is proportional to the square of the amplitude of an unmodulated carrier applied to its input.

**4.45 Crystal Detector** — A diode detector employing a semiconductor diode.

**4.46 Quasi-Peak Detector** — An instrument comprising a detector and an indicating meter. The electrical and mechanical time constants are such that the indication corresponds to a fraction of the peak of the applied signal and increases with the pulse repetition frequency.

NOTE — Such an instrument with carefully defined characteristics is standardized by International Special Committee for Radio Interference ( CISPR ) for noise measurement purposes.

**4.47 Discrimination** — The process of obtaining the modulating signal from a frequency or phase-modulated wave.

**4.48 Frequency ( Phase ) Discriminator/Discriminator** — In a frequency ( phase ) modulation receiver. A device the output of which is substantially proportional to the deviation of the frequency ( phase ) of an alternating input from some predetermined value.

**4.49 Modulation Suppression/Demodulation Effect** — An apparent reduction in the degree of modulation of a received signal caused by the co-existence, at the detector, of an oscillation due to an unwanted signal.

**4.50 Cross-Modulation** — In a receiver. The modulation of a wanted signal by the modulation of an unwanted signal on a different carrier frequency arising from the inter-action of the radio frequency signals in non-linear circuits of the receiver preceding the detector.

# INDEX

NOTE — This index has been prepared in accordance with IS : 1275-1965*. Index numbers are clause numbers.

A

Absorber circuit 3.49
  factor 3.50
Absorption modulation 3.35
Agitation noise, Thermel 4.24
Amplifier noise 4.23
Amplitude
  keying 3.40
  modulation
    Anode 3.33
    by load fluctuation 3.34
Anode
  efficiency of a radio frequency stage 3.55
  power input
    dc 3.53
    Total 3.54
Arc transmitter 3.14
Armstrong modulation 3.37
Autodyne reception 4.8
Automatic
  frequency control 4.34
  gain control 4.31
    Biased 4.32
    Quiet 4.33
  noise limiter 4.29
  tuning control 4.35

B

Bandspreading 4.38
Bandwidth characteristic ( output power Vs frequency characteristic within the passband ) 3.67
Beat-frequency oscillator 4.7
Beat
  oscillator 4.4
  reception 4.3
Biased automatic gain control 4.32

C

Carrier
  demodulation
    Local 4.17
    Reconditioned 4.18
  modulation, Controlled 3.31
  output power 3.65
  power 3.62

Carrier ( *Contd* )
  reception
    Exalted 4.16
    Local 4.17
    Reconditioned 4.18
  transmitter, Suppressed 3.2
Channelized transmitter 3.12
Characteristic, Bandwidth 3.67
Chireix transmitter 3.17
Choke modulation 3.29
Circuit
  Absorber 3.49
  factor, Absorber 3.50
  Tank 3.48
Class A modulation 3.25
Class B modulation 3.26
Constant current modulation 3.29
Consumption, Power 3.56
Continuous spectrum noise, Total 4.25
Control
  Automatic
    frequency 4.34
    gain 4.31
    tuning 4.35
  Biased automatic gain 4.32
  Quiet automatic gain 4.33
Controlled carrier modulation 3.31
Cross-modulation 4.50
Crystal
  detector 4.45
  drive; oscillator drive 3.46
Cycle, Duty 3.70

D

dc anode power input 3.53
Demodulating type repeat 4.51
Demodulation 4.40
  effect 4.49
  Local carrier 4.17
  Reconditioned carrier 4.18
Demodulator 4.42
Detection 4.39
Detector 4.41
  Crystal 4.45
  Linear 4.43
  Quasi-peak 4.46
  Square law 4.44
Discrimination 4.47

---

*Rules for making alphabetical indexes.

- Discriminator 4.48
  - Frequency 4.48
  - Phase 4.48
- Diversity reception 4.15
- Drive
  - Crystal 3.46
    - oscillator 3.46
  - Electromechanical 3.45
  - Line-stabilized oscillator 3.44
  - Resonant-circuit 3.43
  - Tuning-fork oscillator 3.47
- Doherty transmitter 3.19
- Driven transmitter 3.16
- Duty cycle 3.70

**E**

- Effect, Demodulation 4.49
- Efficiency
  - of a radio frequency stage, Anode 3.55
  - Overall 3.57
- Electromechanical drive 3.45
- Envelope power, Peak 3.60
- Exalted carrier reception 4.16

**F**

- Factor
  - Absorber circuit 3.50
  - Noise 4.26
- Fagot modulation transmitter 3.18
- Figure, Noise 4.26
- Fixed frequency transmitter 3.4
- Floating-carrier modulation 3.31
- Frequency
  - discriminator 4.48
  - Image 4.11
  - Intermediate (IF) 4.10
  - modulation by inductance variation 3.38
  - monitor 3.51
  - Quench 4.14
  - Second channel 4.11
  - transmitter, Fixed 3.4
  - characteristic within the RF range, Output power Vs 3.66
  - change oscillator 4.6
  - control, Automatic 4.34
  - division multiplex transmitter 3.7

**G**

- Gain 4.21
  - control
    - Automatic 4.31
    - Biased automatic 4.32
    - Quiet automatic 4.33
- Grid amplitude modulation 3.33

**H**

- Heising modulation 3.29
- Heterodyne reception 4.3
- High
  - level modulation 3.27
  - power modulation 3.27
- Hiss 4.25
- Homodyne reception 4.9

**I**

- Image frequency 4.11
- Impedance, Optimum load 3.59
- Inductance variation
  - Frequency modulation 3.38
  - Phase modulation 3.38
- Input
  - dc anode power 3.53
  - Total anode power 3.54
- Intermediate frequency 4.10
- Interstation
  - muting 4.37
  - noise suppression 4.37

**K**

- Key-click 4.30
- Keying
  - Amplitude 3.40
  - On-off 3.41

**L**

- Limit, Automatic noise 4.29
- Linear detector 4.43
- Line-stabilized oscillator drive 3.44
- Load 3.58
  - fluctuation, Amplitude modulation 3.34
  - impedance, Optimum 3.59
  - Output 3.58
- Local carrier
  - demodulation 4.17
  - reception 4.17
- Low-power modulation 3.28

**M**

- Master oscillator 3.42
- Mean
  - output power 3.64
  - power 3.61
- Mobile transmitter 3.3
- Modulation
  - Absorption 3.55
  - Anode amplitude 3.33
  - Armstrong 3.37
  - Choke 3.29

Modulation ( *Contd* )
  Class A 3.25
  Class B 3.26
  Constant current 3.29
  Controller carrier; floating carrier 3.31
  frequency 3.38
  Grid amplitude 3.33
  Heising 3.29
  High level; High power 3.27
  Low-power 3.28
  Phase 3.38
  Quiescent carrier 3.32
  Series 3.30
  suppression 4.49
  Suppressor grid 3.33
  transmitter, Fagot 3.18
  Wobbel 3.39
Monitor, Frequency 3.51
Multi-carrier radio transmitter 3.11
Multi-channel transmitter 3.10
Multi-frequency transmitter 3.5
Multiple transmitter 3.9
Multiplex transmitter 3.6
  Frequency division 3.7
  Time division 3.8
Muting 4.27
  Interstation 4.37

N

Noise
  Amplifier 4.23
  factor; figure 4.26
  limiter, Automatic 4.29
  Receiver 4.23
  suppression 4.28
    Interstation 4.37
  Thermal 4.24
  Total continuous spectrum 4.25

O

On-off keying 3.41
Optimum load impedance 3.59
Oscillator
  Beat 4.4
    frequency 4.7
  drive
    Line stabilized 3.44
    Tuning-fork 3.47
  Frequency change 4.6
  Local 4.6
  Master 3.42
Output
  load 3.58
  power
    Carrier 3.65
    Mean 3.64

Output ( *Contd* )
  power ( *Contd* )
    Rated 3.63
    Unwanted 3.69
    Useful 3.68
    Vs frequency characteristics within the RF range 3.66
Overall efficiency 3.57
Over-modulation 3.36

P

Peak envelope power 3.60
Phase
  discriminator 4.48
  modulation by inductance variation 3.38
Power
  Carrier 3.62
  consumption 3.56
  input
    dc anode 3.53
    Total anode 3.54
  Mean 3.61
  Peak envelope 3.60

Q

Quasi-peak detector 4.46
Quench frequency 4.14
Quiet automatic gain control 4.33
Quiescent carrier modulation 3.32

R

Radiation, Receiver 4.22
Radio
  frequency stage, Anode efficiency of 3.55
  receiver 4.1
  station 2.2
  transmitter 3.1
    Multi-carrier 3.11
Rated output power 3.63
Receiver
  radiation 4.22
  Radio 4.1
Reception
  Autodyne 4.8
  Beat 4.3
  Diversity 4.15
  Exalted carrier 4.16
  Heterodyne 4.3
  Homodyne 4.9
  Local carrier 4.17
  Reconditioned carrier 4.18
  Regenerative 4.12
  Straight 4.2
  Superheterodyne 4.5
  Super regenerative 4.13
  Tuned RF 4.2

Reconditioned carrier
  demodulation 4.18
  reception 4.18
Regenerative reception 4.12
Repeat, Demodulation type 4.51
Resonant circuit drive 3.43
RF reception, Tuned 4.2

S

Scintillation 3.71
Second-channel frequency 4.11
Self-excited transmitter 3.15
Selectivity 4.20
Sensitivity 4.19
Series modulation 3.30
Set noise 4.23
Sound transmitter, Television 3.20
Spark gap 3.52
Spark transmitter 3.13
Spectrum noise, Total continuous 4.25
Square law detector 4.44
Squelch 4.27
Station, Radio 2.2
Straight reception 4.2
Superheterodyne reception 4.5
Super-regenerative reception 4.13
Suppressed carrier transmitter 3.2
Suppression
  Interstation noise 4.37
  Modulation 4.49
  Noise 4.28
Suppressor grid amplitude modulation 3.33

T

Tank circuit 3.48
Television
  sound transmitter 3.20
  transmitter 3.22
  vision transmitter 3.21
Thermal agitation noise; Thermal noise 4.24
Time-division multiplex transmitter 3.8
Total
  anode power input 3.53

Total ( *Contd* )
  continuous spectrum noise 4.25
Trap, Wave 4.36
Transmitter
  Arc 3.14
  Channelized 3.12
  Chireix 3.17
  Doherty 3.19
  Driven 3.16
  Fagot modulation 3.18
  Fixed-frequency 3.4
  Frequency
    division multiplex 3.7
    modulation 3.18
  Mobile 3.3
  Multicarrier radio 3.11
  Multichannel 3.10
  Multi-frequency 3.5
  Multiple 3.9
  Multiplex 3.6
  Self-excited 3.15
  Spark 3.13
  Suppressed carrier 3.2
  Television 3.22
    sound 3.20
    vision 3.21
Time-division multiplex 3.8
Transmitter-receiver 3.23
Transmitters, Radio 3.1
Transceiver 3.24
Tuning control, Automatic 4.35
Tuning fork oscillator drive 3.47

U

Unwanted output power 3.69
Useful output power 3.68

V

Vision transmitter, Television 3.21

W

Wave trap 4.36
Wobble modulation 3.39

( *Continued from page* 2 )

| *Members* | *Representing* |
|---|---|
| SHRI M. V. NAMJOSHI | All India Instrument Manufacturers' and Dealers' Association, Bombay |
| SHRI N. BALASUNDARAM ( *Alternate* ) | |
| SHRI A. V. RAJU | Directorate of Technical Development & Production ( Air ) ( Ministry of Defence ) |
| SHRI S. DESIKAMANI ( *Alternate* ) | |
| SHRI T. V. RAMAMURTI | Safety for Electronic Equipment Subcommittee, ETDC 24 : 3, ISI |
| DR RAM PARSHAD | National Physical Laboratory ( CSIR ), New Delhi |
| SHRI V. V. RAO | Radio Transmitters Subcommittee, ETDC 24 : 4, ISI |
| SHRI M. SANKARALINGAM | Directorate General of Supplies & Disposals ( Ministry of Supply, Technical Development & Materials Planning ) |
| SHRI P. T. KRISHNAMACHAR ( *Alternate* ) | |
| SHRI M. V. SHANKAR | Railway Board ( Ministry of Railways ) |
| KUMARI B. H. SHANTA | Electronic Measuring Equipment Subcommittee, ETDC 24 : 2, ISI |
| SHRI T. S. SUBRAMANIAN | Directorate General of Posts & Telegraphs ( Department of Communications ) |
| COL D. SWAROOP | Directorate General of Inspection ( Ministry of Defence ) |
| SHRI S. VENKATARAMAN | Radio, Electronics and Television Manufacturers' Association ( India ), Calcutta |
| SHRI S. C. ISRANI ( *Alternate* ) | |
| SHRI Y. S. VENKATESWARAN, Director ( Elec tech ) | Director General, ISI ( *Ex-officio Member* ) |

*Secretary*

SHRI N. SRINIVASAN
Deputy Director ( Elec tech ), ISI

## BUREAU OF INDIAN STANDARDS

*Headquarters* .

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 3 31 01 31, 3 31 13 75 | Telegrams : Manaksanstha
( Common to all Offices )

| *Regional Offices :* | *Telephone* |
|---|---|
| *Western ; Manakalaya, E9 MIDC, Marol, Andheri ( East ) BOMBAY 400093 | 6 32 92 95 |
| †Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054 | 36 24 99 |
| Northern : SCO 445-446, Sector 35-C CHANDIGARH 160036 | 2 18 43<br>3 16 41 |
| Southern : C. I. T. Campus, MADRAS 600113 | 41 24 42<br>41 25 19<br>41 29 16 |

| *Branch Offices :* | |
|---|---|
| Pushpak,' Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001 | 2 63 48<br>2 63 49 |
| 'F' Block, Unity Bldg, Narasimharaja Square, BANGALORE 560002 | 22 48 05 |
| Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, BHOPAL 462003 | 6 27 16 |
| Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002 | 5 36 27 |
| 53/5 Ward No. 29, R. G. Barua Road, 5th Byelane, GUWAHATI 781003 | — |
| 5-8-56C L. N. Gupta Marg, (Nampally Station Road), HYDERABAD 500001 | 22 10 83 |
| R14 Yudhister Marg, C Scheme, JAIPUR 302005 | 6 34 71<br>6 98 32 |
| 117/418B Sarvodaya Nagar, KANPUR 208005 | 21 68 76<br>21 82 92 |
| Patliputra Industrial Estate, PATNA 800013 | 6 23 05 |
| Hantex Bldg ( 2nd Floor ), Rly Station Road, TRIVANDRUM 695001 | 52 27 |
| *Inspection Office* ( With Sale Point ): | |
| Institution of Engineers ( India ) Building, 1332 Shivaji Nagar, PUNE 410005 | 5 24 35 |

---

*Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 — 89 65 28

†Sales Office in Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, Calcutta 700072 — 27 68 00

Reprography Unit, BIS, New Delhi, India